

An Intrafirm Analysis of Financial Statements of Country Elevators

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INTRODUCTION

Financial statements provide basic information on the financial position of a firm to assist management in making operational decisions. Financial records represent composites of the major functions in the firm's operations expressed in monetary terms as a common denominator. This common denominator enables a manager or owner to make yearly comparisons of the different functions in the firm's operations.

Accurate financial reports are necessary for making meaningful financial analyses of a firm's operations. A knowledge of the use of the information in financial statements is a prime prerequisite for this type of analysis. If a manager lacks the ability to effectively use the information provided in the financial statement, the statement is of little value to the manager in performing the management function.

Thus, the analysis of a financial statement is only beneficial when the information is accurate and the capabilities of management will allow proper analysis of the data presented in the report.

For many years research efforts have been directed towards analyses which would provide results which would assist country elevator managers in a more effective use of financial statements in making management decisions. Most studies have emphasized interfirm comparisons of hypothesized important relationships in financial statements. These studies usually analyzed several firms' financial statements over a period of years, with sufficient observations for significance testing of results of the hypothesized financial relationships.

An assumption of homogeneity among firms is necessary for meaningful interfirm comparisons. This broad assumption means that the economic environment of all firms is the same, even though firms have different capital structures, perform different services and functions, and have different accounting systems. Since there is considerable variation in these factors between individual country elevator firms, this assumption may not be valid.

To illustrate the basic differences between two firms which could be considered the same in such an analysis, two hypothetical brief financial statements

are shown (Table 1). Interfirm comparisons often use various measures of profitability to compare one firm with another.

The two firms in this example appear comparable on net profits. Example 1 had net profits for the year of \$85,595.01. Example 2 had net profits of \$86,288.00 during the same period, with a difference in the net profits of the two firms of \$692.99. The net profit per dollar sale of the two firms is also comparable, with Example 1 having 3.799¢ and Example 2, 4.538¢. Interfirm comparisons of profitability would indicate that these two firms had comparable success over that year of operation.

The two firms generated similar income patterns, even though they have entirely different capital structures. Example 1 has \$332,856.89 total current assets while Example 2 current assets are \$497,896.00. Example 1 has \$201,440.72 total current liabilities while Example 2's total current liabilities are \$41,996.00. Example 1's total current assets are 1.65 times greater than its total current liabilities, while Example 2's total current assets are 11.86 times greater than its total current liabilities. Example 2's total net worth is 1.90 times greater than Example 1's.

Although the two firms have comparable profit and loss statements, their capital structures are entirely different and cannot be considered as homogeneous.

Another limitation to interfirm analysis of financial statements is the lack of uniformity in the preparation of financial statements by the various accountants providing this service. Some accountants provide considerable delineation on income and expense items. Others group many items in order to provide greater simplicity; however, grouping techniques vary greatly among accountants. These differences in accounting techniques make it almost impossible to accurately compare the operation of one firm with another. Unless identical accounting systems or techniques are used, interfirm comparison of any kind is often meaningless. Research results at the Ohio Agricultural Research and Development Center and other experiment stations and state universities throughout the grain belt have rather uniformly supported this thesis.

For more than 40 years the Ohio Cooperative Extension Service has made brief analyses of the fi-

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financial audits of cooperative elevators. A series of articles was published in the period 1928-1954 to show interfirm comparisons on an actual basis.² These reports and other research results have contributed greatly to acquainting elevator managers with the use of their financial audits.

PURPOSE

The purpose of this study was to determine whether historical financial statements can be used to assist management in predicting the performance of a firm under static or varying conditions of inputs. By using historical information from the financial statements, an effort was made to determine the reliability of using various financial and operational ratios as a guide in planning future operations and

²Ohio Grain Elevator Analyses, 1928-1954. Ohio Cooperative Extension Service.

predicting the financial behavior of country elevator firms.

METHOD OF STUDY

Previous research with financial statements using interfirm analysis provided information which is useful in establishing industry standards. However, country elevator management has found difficulty in applying these standards to a particular elevator operation. The greatest handicap to using research results based on interfirm analysis is the lack of homogeneity of the financial statement and these deviations can be extreme.

To overcome this handicap in using the financial statement as a comparative measure of success, an attempt was made to compare changes of the financial structure and operation within a given firm

TABLE 1.—Statement of Operations of Two Country Elevators.

Example 1		Example 2	
Sales for Year		Sales for Year	
Grain and Seed	\$2,252,984.57	Supply Sales	\$1,303,882.00
Farm Supplies	638,795.94	Marketing Sales	597,537.00
Total Sales	\$2,891,780.51	Total Sales	\$1,901,419.00
Less: Cost of Sales	2,660,116.04	Cost of Goods Sold	1,671,583.00
Gross Selling Margin	231,664.47	Gross Margin—Supply 15.8 %	\$ 205,780.00
		Gross Margin—Marketing 4.0 %	24,056.00
			229,836.00
Other Revenue		Other Income	
Grinding	6,259.23	Grinding and Shelling	\$ 8,676.00
Refunds Earned	1,098.34	Purchase Discounts	25,863.00
Interest Earned	308.00	Trucking Income	12,509.00
Trucking	6,765.59	Storage Income	5,140.00
Storage—Net	13,059.35	Cleaning and Treating	3,757.00
Equipment Rental	896.28	Accounts Receivable Carrying Charge	8,430.00
Total Other Revenue	28,386.79	Grain Drying Charges	6,106.00
Total Revenue	\$ 260,051.26	Miscellaneous Income	11,386.00
		Total Other Income	81,867.00
		Total Income	\$ 311,703.00
Expenses		Expenses	
Salaries and Labor	93,435.63	Labor	\$ 114,082.00
Power, Fuel, and Water	6,061.63	Depreciation on Building and Equipment	27,768.00
Truck Expenses	10,965.11	Heat, Light, and Power	4,738.00
Depreciation	24,331.24	County Taxes	7,574.00
Repairs and Supplies	6,306.62	Supplies	3,993.00
Insurance	4,149.80	Insurance	5,662.00
Taxes and License	14,931.51	Repairs on Building and Equipment	8,582.00
Advertising	1,593.85	Truck Operating Expenses	13,990.00
Telephone	1,647.32	Advertising	926.00
Office Supplies	2,523.46	Reserve for Bad Debt	6,655.00
Interest—Debentures	2,235.15	Telephone, Telegraph, and Postage	2,243.00
Bad Debt Reserve	1,178.98	Directors' Fees	1,412.00
Rent	1,020.00	Cash Discounts Allowed	11,531.00
Miscellaneous	4,075.95	Social Security Taxes	4,925.00
Total Expenses	\$174,456.25	Miscellaneous Expenses	11,334.00
NET SAVINGS	\$ 85,595.01	Total Expenses	\$225,415.00
		NET SAVINGS	\$ 86,288.00

TABLE 2.—Balance Sheets for Two Country Elevators.

Example 1			Example 2		
ASSETS			ASSETS		
Current Assets			Current Assets		
Cash on Hand and in Bank		\$104,652.94	Cash on Hand and in Bank		\$144,161.00
Customer Receivables	76,850.80		Accounts Receivable	\$220,586.00	
Less: Reserve for Bad Debts	6,583.44	70,267.36	Less: Reserve for Bad Debt	15,100.00	
Other Receivables	47,065.12				205,486.00
Inventory—Grain and Merchandise		109,030.45	Notes Receivable		44,044.00
Prepaid Items		1,841.02	Miscellaneous Receivable		6,288.00
			Merchandise Inventory		96,277.00
Total Current Assets		\$332,856.89	Merchandise in Transit		1,640.00
					\$497,896.00
Investments			Total Current Assets		
Ohio Equity, Inc.	18,763.20		Fixed Assets		
Other Cooperatives	102.01		Land and Improvements		\$ 5,149.00
Total Investments		\$ 18,865.21	Facilities Under Construction		1,053.00
			Buildings	\$232,773.00	
Fixed Assets			Less: Accumulated Depreciation	88,868.00	
Land, Buildings and					143,905.00
Equipment—Cost	467,241.30		Machinery and Equipment	124,626.00	
Less: Depreciation Reserve	185,634.40		Less: Accumulated Depreciation	90,130.00	
Net Fixed Assets		\$281,606.90			34,496.00
			Office Equipment	12,422.00	
Total Assets		\$633,329.00	Less: Accumulated Depreciation	7,763.00	
					4,659.00
LIABILITIES AND NET WORTH			Delivery Equipment	59,756.00	
Current Liabilities			Less: Accumulated Depreciation	41,428.00	
Accounts Payable—Trade	48,051.99				18,328.00
Accounts Payable—Customer	70,943.17		Outside Equipment	78,073.00	
Accrued Expenses	15,801.31		Less: Accumulated Depreciation	51,795.00	
Debenture Bonds	33,000.00				26,278.00
Dividends and Refunds Payable	33,644.25		Total Fixed Assets		\$233,868.00
Total Current Liabilities		\$201,440.72	Deferred Charges		
			Prepaid Expenses		\$ 2,441.00
Net Worth			Other Assets:		
Preferred Capital Stock Outstanding	104,050.00		Investment in Other Cooperatives		
Common Capital Stock Outstanding	227,225.00		Through Patronage Savings		\$129,503.00
Part Payment on Capital Stock	38,021.20		Total Assets		\$863,708.00
Allocated Reserve	53,256.97				
General Reserve	9,335.11				
Total Net Worth		\$431,888.28			
TOTAL LIABILITIES AND NET WORTH		\$633,329.00	LIABILITIES		
			Current Liabilities		
			Accounts Payable		\$ 17,115.00
			Accrued Taxes		2,973.00
			Accrued and Miscellaneous Payable		15,144.00
			Dividends Payable—Capital Shares		6,764.00
			Total Current Liabilities		\$41,996.00
			Net Worth		
			Capital Shares		
			First Preferred Shares Issued	\$114,675.00	
			Common Shares Issued	25,750.00	
			Certificates of Ownership	437,774.00	
			Fractional Shares—Patronage Refund	1,811.00	
			Total Stock and Fractional Shares		\$580,010.00
			Reserve Accounts		
			Patronage Income to Contingent Reserve		2,752.00
			Reserve for Operating Capital		141,003.00
			Net Savings for Year	\$104,711.00	
			Less: Dividends Declared	6,764.00	
					97,947.00
			Total Net Worth		\$821,712.00
			TOTAL LIABILITIES AND NET WORTH		\$863,708.00

from year to year by using intrafirm analysis. The following objectives were used as a guide for this type of analysis.

- To determine meaningful financial ratios applicable for intrafirm analyses of country elevators.
- To observe relative and actual comparisons of these ratios for the firms in this study.
- To establish general guidelines of expected actual changes of one element of each ratio with a given change in the other element of each ratio.

Financial statements were collected from 110 country elevators in Ohio for the period from 1957 through 1966. Four of these elevators were selected to represent all extremes of financial success and the statements for these firms were used in the analysis.

The financial statements of the four firms were prepared by each firm's own accountant at the end of each financial year, with each firm employing different accountants to prepare the statements.

Step-wise regression problems were solved for each of the four firms using a large group of the most commonly used variables and financial ratios. The step-wise regression problems were used as a search procedure to verify the applicability of certain financial ratios for intrafirm financial analyses of the different trends of return on total assets³ for the four firms from 1957 through 1966. The R² value was used as the criterion to verify the applicability of the ratios.

DESCRIPTION OF SAMPLE FIRMS

The financial statements of 110 firms were observed over a period of 10 years and a model firm was selected from this group. To qualify as a model firm, the firm selected must have performed the functions and services normally performed by country elevators and have consistently maintained a return on its total assets sufficient to attract new capital and to be competitive with other similar uses of capital.

Since storage is one of the most important functions of a country elevator, it was used as one of the limiting factors in selecting the model firm. It was assumed that a model country elevator should have at least 100,000 bushels of storage capacity. A study conducted in North Dakota concluded that elevators with less than 100,000 bushels of storage capacity are considered inefficient and could not adequately perform the functions required of them.⁴ Forty-nine

³Return on Total Assets = $\frac{\text{Net Profit Before Income Tax (\$)}}{\text{Total Assets (\$)}}$

⁴Velde, Paul D., Fred R. Taylor, and Jerome W. Hammond. 1966. The Organization of Country Markets for Grain in North Dakota. North Dakota Agricultural Experiment Station, Agri. Econ. Report No. 49.

TABLE 3.—Operating Statement for Model Firm.

Grain Sales	\$1,769,588	
Supply Sales	702,528	
Total Sales		\$2,472,116
Less: Cost of Goods Sold		2,280,106
Gross Margins		\$ 192,010
Add: Other Operating Income		23,657
Total Income		\$ 215,667
Less: Operating Expenses		134,101
Net Profit Before Income Tax		\$ 81,566

Source: Financial statement of model firm for recent year.

of the 110 elevators observed had more than 100,000 bushels of storage capacity. These 49 firms were further analyzed to determine which firm most nearly represented the requisites set forth for the model firm to be used for the study.

Return on total assets, which is a profitability ratio of management's overall effectiveness in generating returns on the assets of the firm, was used as the second limiting factor of the 49 remaining elevators. A firm with a consistently high return on its total assets over the 10-year period was selected as the model firm. The return on total assets of this model firm ranged from 13.52 percent to 19.12 percent during the 10-year period, with an average return on total assets of 16.13 percent. The return of 16.13 percent on total assets is believed to be sufficient to attract capital into firms providing similar services and will support necessary modernizations and innovational changes of the industry. The model firm provided those services and functions demanded by farmers on a profitable basis and showed a steady growth both in investment and volume of business.

A condensed operating statement and a balance sheet of the model firm for 1 of the 10 years are shown in Tables 3 and 4. In this particular year, the firm had a return on total assets of 16.58 percent which

TABLE 4.—Balance Sheet for Model Firm.

Assets	
Total Current Assets	\$252,265
Investments	48,075
Net Fixed Assets	191,629
Total Assets	\$491,969
Liabilities and Net Worth	
Total Current Liabilities	\$131,899
Total Net Worth	360,070
Total Liabilities and Net Worth	\$491,969

Source: Financial statement of model firm for recent year.

was comparable to the average return on total assets of 16.13 percent for the 10-year period. The operating statement and balance sheet represent the financial position of the firm for that year and indicate the absolute magnitude of the income stream and balance sheet relations for the firm.

After the model firm was selected, three additional firms were selected for additional intrafirm analysis. These three country elevators had significantly different patterns of returns on assets for the period 1957 through 1966.

The first of the three firms, Firm A, was selected because of its upward trend of return on total assets from 1957 through 1966. This firm had a return on total assets of -4.22 percent in 1957 but had increased its return on total assets to 3.37 percent by 1966. Although the return on total assets of 3.37 percent in 1966 is not as high as the model firm's return on total assets, the upward trend of this ratio over the 10-year period indicates an improvement in the financial condition of the firm and it was selected for this reason.

The second firm, Firm B, was selected because of its downward trend of return on total assets from 1957 through 1966. This firm had a return on total assets of 16.74 percent in 1957 but its return on total assets had decreased to 2.30 percent by 1966. This downward trend indicates a weakening of the financial condition of the firm and it was selected for this reason.

The third firm, Firm C, was chosen because of its downward trend of return on total assets from 1957 through 1966. This firm had a return on total assets of 13.57 percent in 1957 but it had decreased to 1.86 percent in 1966. This firm was selected because it experienced a significant decrease in return on assets and in addition it failed financially.

The four firms selected for intrafirm analysis represent different trends in the return on total assets. The model firm and Firm A increased or improved their return on total assets and financial condition from 1957 through 1966. Firm B decreased its return on total assets or weakened its financial condition from 1957 through 1966. Firm C decreased its return on total assets from 1957 through 1966 and failed financially.

INTRAFIRM ANALYSIS

The selection of financial ratios for intrafirm analysis consisted of a search for meaningful financial ratios which could be used to explain trends of return on total assets for a country elevator. Return on total assets was selected as the best measure of success because it represents relative comparisons of the efficiency with which management has generated returns on the owners' invested capital.

A step-wise regression problem was solved for the model firm, with return on total assets used as the dependent variable. This analysis was used as a method for ranking the financial ratios selected as independent variables according to the importance of each in explaining variation of return on total assets over the 10-year period examined. The R^2 value was used as the principal criterion in selecting independent variables most related to the dependent variable. This method of analysis amounted to a search procedure for interpretive use of the results.

Fourteen of the most commonly used independent variables were introduced into the step-wise regression problem. The variables were:

$$X_1 = \frac{\text{Net Receivables} - \text{Trade Receivables}}{\text{Supply Sales}}$$

$$X_2 = \frac{\text{Total Other Operating Income}}{\text{Net Fixed Assets}}$$

$$X_3 = \frac{\text{Total Sales}}{\text{Total Assets}}$$

$$X_4 = \frac{\text{Labor Expenses}}{\text{Total Operating Expenses}}$$

$$X_5 = \frac{\text{Labor Expenses}}{\text{Net Fixed Assets}}$$

$$X_6 = \frac{\text{Repairs Expenses}}{\text{Net Fixed Assets}}$$

$$X_7 = \frac{\text{Depreciation Expenses}}{\text{Total Operating Expenses}}$$

$$X_8 = \frac{\text{Grain Sales}}{\text{Total Sales}}$$

$$X_9 = \frac{\text{Fertilizer Sales}}{\text{Total Sales}}$$

$$X_{10} = \frac{\text{Feed Sales}}{\text{Total Sales}}$$

$$X_{11} = \frac{\text{Truck Expenses}}{\text{Total Operating Expenses}}$$

$$X_{12} = \frac{\text{Net Sales}}{\text{Operating Assets}^5}$$

$$X_{13} = \frac{\text{Total Operating Expenses}}{\text{Total Sales}}$$

$$X_{14} = \frac{\text{Fixed Assets}}{\text{Net Worth}}$$

Various combinations of these variables were used in the step-wise regression procedure since the limitation of the degrees of freedom would not allow all 14 variables to be entered into the same problem. The selection of these variables was made according

⁵Operating Assets = Total Assets — Investments

to the R^2 values of each based on simple regression problems solved for each variable individually. Multiple regression analyses from previous research also served as a guideline in selecting the various combinations of variables to be used. A combination of seven variables produced the most significant results and because of this indication the other seven were not used. This does not infer, however, that these other seven variables have no values in measuring business success but that their contribution to the meaningful solution of this problem was less than that of the seven selected.

When the seven selected independent variables entered the step-wise regression problem, they produced an R^2 value of 99.77 percent. The order in which these independent variables entered the problem and the contribution of each variable to total R^2 due to the addition of it in the problem are shown in Table 5.

These seven independent variables were interpreted as the variables which contributed most to explaining the trend of return on total assets for the model firm because of the high total R^2 value pro-

TABLE 5.—Contribution to R^2 Value of Seven Independent Variables Which Entered Step-Wise Regression Problem for Model Firm.

Order in Which Independent Variable Entered Problem	Independent Variable	Contribution to Total R^2 (%)
1	X_4 : Labor Expenses to Total Operating Expenses	70.43750
2	X_9 : Fertilizer Sales to Total Sales	13.17300
3	X_6 : Repairs Expenses to Net Fixed Assets	1.45069
4	X_8 : Grain Sales to Total Sales	3.51795
5	X_{11} : Truck Expenses to Total Operating Expenses	3.61960
6	X_{10} : Feed Sales to Total Sales	4.16044
7	X_5 : Labor Expenses to Net Fixed Assets	3.40765
	TOTAL R^2	99.76683

Source: Original data.

The final regression equation for these seven variables was:

$$Y = -159.909 + 1.55311 X_4 - .207647 X_9 + 1.12090 X_6 + 1.306645 X_8 - 1.241383 X_{11} + 3.72441 X_{10} - .205206 X_5^{**}$$

(13.307)* (-3.369) (3.048) (9.756) (-8.693) (6.944) (-5.037)

*Values in parentheses represent t-test results, all of which were significant at the 95 % level.

**The F statistic was significant at the 99 % level.

duced by the equation. This indicated that the trends of these seven ratios over the 10-year period explain the return of total assets for the model firm. The variable with the highest contribution to the total R^2 was assumed to be most important in explaining this trend.

The applicability of using these ratios for firms with different trends of return on total assets was examined to assure that the ratios could be used in intrafirm analysis when the trend of return on total assets was different than that of the model firm. The data from the three firms with different rates of return on total assets were treated in the same manner as the data from the model firm to determine whether these relationships were common with the four firms used in the analysis.

A step-wise regression problem was solved for Firm A with return on total assets as the dependent variable and the seven financial ratios as the independent variables for the 10-year period from 1957 through 1966. The seven independent variables produced a total R^2 value of 98.79 percent. The order in which the independent variables entered the prob-

TABLE 6.—Contribution to R^2 Value of Seven Independent Variables Which Entered Step-Wise Regression Problem for Firm A.

Order in Which Independent Variable Entered Problem	Independent Variable	Contribution to Total R^2 (%)
1	X_5 : Labor Expenses to Net Fixed Assets	64.64030
2	X_4 : Labor Expenses to Total Operating Expenses	16.31680
3	X_{10} : Feed Sales to Total Sales	1.47706
4	X_6 : Repairs Expenses to Net Fixed Assets	4.00857
5	X_{11} : Truck Expenses to Total Operating Expenses	2.61339
6	X_8 : Grain Sales to Total Sales	.09539
7	X_9 : Fertilizer Sales to Total Sales	9.63876
	TOTAL R^2	98.79027

Source: Original data.

The final regression equation for these seven variables for Firm A was:

$$Y = -1932.14 - .905262 X_5 + 3.2645 X_4 + 22.38 X_{10} - 1.56501 X_6 - 5.50873 X_{11} + 18.5163 X_8 + 28.1175 X_9^{**}$$

(-2.192)* (2.943) (4.443) (-2.646) (-3.372) (3.948) (3.934)

*Values in parentheses represent t-test results, all of which except X_5 were significant at the 95 % level.

**The F statistic was significant at the 95 % level.

lem and the contribution of each variable to total R^2 due to the addition of it in the problem are shown in Table 6.

The high R^2 value of 98.79 percent indicated that with Firm A, which had an upward trend of return on total assets over the 10-year period, the seven financial ratios also proved to be important ratios in explaining the trend of return on total assets. The independent variables did not enter the problem for Firm A in the same order as for the model firm. However, the order in which the independent variables entered the problem is not as important as the indication that these variables, as a group, can be useful in explaining the upward trend of return on total assets of Firm A for the 10-year period examined.

A step-wise regression problem was solved for Firm B with return on total assets as the dependent variable and the seven financial ratios as the independent variables for the 10-year period from 1957 through 1966. The seven independent variables had a total R^2 of 94.84 percent. The order in which the independent variables entered the problem and the contribution of each variable to total R^2 due to the addition of it in the problem are shown in Table 7.

The high R^2 value of 94.84 percent indicated that with Firm B, which had a downward trend of return on total assets over the 10-year period, the seven financial ratios proved again to be important in explaining the trend of return on total assets. It was not considered important that the independent variables did not enter the problem for Firm B in the same order as for the model firm. However, it is important that the group of seven variables was highly related to the trend of return on total assets. The lack of statistical significance in this problem was not a serious obstacle in interpreting the result, since the problem was used mainly as a search procedure to find financial ratios which were related to the trend of return on total assets. The high R^2 for the problem is useful for interpretive purposes and the seven ratios appear to be important in explaining Firm B's downward trend of return on total assets for the 10-year period.

A step-wise regression problem was solved for Firm C with return on total assets as the dependent variable and five of the seven financial ratios as the independent variables for the 10-year period from 1957 through 1966. The variables X_9 , fertilizer sales to total sales, and X_{10} , feed sales to total sales, could not be included in the problem because feed sales and fertilizer sales could not be accurately separated from the other income data of the financial statements of Firm C. This was an unfortunate limitation on the problem. Even though only five of the seven inde-

TABLE 7.—Contribution to R^2 Value of Seven Independent Variables Which Entered Step-Wise Regression Problem for Firm B.

Order in Which Independent Variable Entered Problem	Independent Variable	Contribution to Total R^2 (%)
1	X_9 : Fertilizer Sales to Total Sales	67.73830
2	X_{10} : Feed Sales to Total Sales	12.89900
3	X_5 : Labor Expenses to Net Fixed Assets	10.87090
4	X_6 : Repairs Expenses to Net Fixed Assets	.78879
5	X_{11} : Truck Expenses to Total Operating Expenses	.95991
6	X_4 : Labor Expenses to Total Operating Expenses	.41994
7	X_8 : Grain Sales to Total Sales	1.16746
TOTAL R^2		94.84350

Source: Original data.

The final regression equation for the seven independent variables for firm B was:

$$\begin{aligned}
 Y = & 68.2021 - 2.31174 X_9 - 1.07687 X_{10} \\
 & \quad (-1.772)^* \quad (-0.902) \\
 & + .236127 X_5 - .17372 X_6 - 1.58755 X_{11} \\
 & \quad (0.904) \quad (-0.125) \quad (-0.939) \\
 & - 1.01381 X_4 + .391591 X_8 \\
 & \quad (-0.737) \quad (0.699)
 \end{aligned}$$

*Values in parentheses represent t-test results, none of which were significant at the 95 % level. The F statistic was not significant at the 95 % level.

pendent variables were available for analysis, Firm C (which failed financially) was selected since it may be possible to determine at what point in time the financial statement information can indicate possible financial failure.

The five independent variables produced an R^2 value of 84.87 percent. This result was considered important and meaningful, even though the total R^2 value for the five variables was lower than that produced by the seven variables used for the model firm, Firm A, or Firm B. The order in which the independent variables entered the problem and the contribution of each variable to total R^2 value due to their addition in the problem are shown in Table 8.

Because of the high R^2 value, the five financial ratios are important ratios and can be used in explaining the downward trend of return on total assets and the financial failure of Firm C. The order in which the independent variables entered the problem and the lack of statistical significance were not considered important. It is important, however, that the R^2 value indicates that the five independent variables explained the downward trend of return on total assets and are useful in explaining that trend.

TABLE 8.—Contribution to R² Value of Five Independent Variables Which Entered Step-Wise Regression Problem for Firm C.

Order in Which Independent Variable Entered Problem	Independent Variable	Contribution to Total R ² (%)
1	X ₄ : Labor Expenses to Total Operating Expenses	52.46240
2	X ₆ : Labor Expenses to Net Fixed Assets	24.46410
3	X ₁₁ : Truck Expenses to Total Operating Expenses	7.65625
4	X ₆ : Repairs Expenses to Net Fixed Assets	.28104
5	X ₈ : Grain Sales to Total Sales	.00507
	TOTAL R ²	84.86886

Source: Original data.

The final regression equation for the five independent variables for Firm C was:

$$Y = -17.9192 + 1.7245 X_4 - 1.89135 X_5 \\ \quad \quad \quad (2.814)^* \quad \quad \quad (-2.118) \\ -3.12584 X_{11} - .371232 X_6 + 28.487 X_8 \\ \quad \quad \quad (-1.33) \quad \quad \quad (-0.246) \quad \quad \quad (+0.004)$$

*Values in parentheses represent t-test results, none of which were significant at the 95 % level. The F statistic was not significant at the 95 % level.

The independent variables which were useful in explaining the trend of return on total assets of the model firm were also useful in analyzing the trends of return on total assets of the other three firms. Since a sample of firms with varying financial performance all provided similar results, this would suggest a more universal applicability of the use of these financial ratios in explaining trends of return on total assets of country elevators providing that intrafirm analysis is used. The simplicity of calculating the financial ratios used in this analysis enhances the practicality and feasibility of each elevator manager applying this technique to the financial data of his own country elevator operation.

Intrafirm Relationships

Trend lines were fitted to the actual data of the seven selected ratios for each of the four firms. These trends were analyzed for all four firms in the order in

which they entered the step-wise regression problem for the model firm. This analysis provides an indication of how the trends of the financial ratios for the four firms varied and provides guidelines as to how a firm is affected by changes in components of the ratios by using the model firm as the standard.

The dependent variable, return on total assets, is shown in absolute terms for all four firms. This measure was used as a profitability measure of how well management is utilizing the total assets of the firm. The trends of return on total assets, net profit before income tax, and total assets are shown in Table 9.

The model firm had a small average decreasing trend of return on total assets over the 10-year period. Although it would be desirable for this trend to be at least constant, the model firm maintained a return on total assets of more than 13.52 percent over the 10-year period which was the highest of the 49 firms for which data were available. The model firm had an average annual increase of net profit before income tax of \$3,262 and of total assets of \$28,015. The ability of this firm to increase total assets and at the same time increase net profit before income tax further supported its selection as the model firm of the study. The changes in the trends for firms A, B, and C are also shown in Table 9.

Of the financial ratios used as independent variables in this analysis, variable X₄, the ratio of labor expenses to total operating expense, entered the step-wise regression problem first for the model firm. Labor expense is the most important operating cost item of a country elevator. This item accounted for 42 to 62 percent of the total operating expenses for the four firms in the study. The trends in the ratio of labor expenses to total operating expenses, labor expenses, and total operating expenses for the four firms are shown in Table 10.

All four firms of the study had an average annual decreasing trend of labor expenses to total operating expenses over the 10--year period. All four firms had a positive annual average increase of total assets and net fixed assets, which suggests that the firms experienced some substitution of capital for

TABLE 9.—Average Annual Trends of Return on Total Assets, Net Profit Before Income Tax, and Total Assets for Four Firms in Study, 1957-1966.

Firm	Average Annual Trend of Return on Total Assets (%)	Average Annual Trend of Net Profit Before Income Tax (\$)	Average Annual Trend of Total Assets (\$)
Model	-0.38	+3,262.	+28,015.
Firm A	+0.94	+2,932.	+ 9,537.
Firm B	-1.42	-2,290.	+15,497.
Firm C	-0.96	-4,606.	+19,999.

labor. The model firm had an increasing trend of labor expenses accompanied by an increasing trend of total expenses. For the model based on this analysis, it would be expected that for the model firm labor expenses would increase as other expense items increased. This increase in labor expenditures was also accompanied by increases in capital expenditures (see Table 9). This measure indicates a rate of substituting capital for labor with the model firm but it is not complete substitution. In the case of Firm C, it appears to be complete substitution or even a reduction of labor expenses as capital was added and the result may have been responsible for the firm's financial failure.

Using the model firm as a standard, the average annual decrease in labor expenses to total operating expenses should be approximately 0.25 percent. For each \$1 increase in operating expenses, labor expenses might be expected to increase approximately 50 cents.⁶ Firm A and Firm B met this standard. Firm C was below this standard.

Variable X₃, fertilizer sales to total sales, was the second independent variable to enter the step-wise regression problem for the model firm. Many country elevators sell bag, bulk, and liquid fertilizer and rent fertilizer spreaders to farmers. The trends of

fertilizer sales to total sales, fertilizer sales, and total sales are shown in Table 11.

The three firms for which data were available all had increasing average annual trends of fertilizer sales to total sales. Using the model firm as a standard, for every \$1 increase in total sales, fertilizer sales might be expected to increase approximately 13 cents. Firm A was below this standard and Firm B was above this standard. The variation among firms was not considered particularly significant because of exogenous factors which affect fertilizer sales, such as competitive outlets of fertilizer within a firm's sales territory.

Variable X₆, repairs expenses to net fixed assets, was the third independent variable to enter the step-wise regression problem for the model firm. This is a measure of the extent of upkeep of net fixed assets. The trends of repairs expenses to net fixed assets, repairs expenses, and net fixed assets are shown in Table 12.

The data in Table 12 indicate that the model firm and Firm A had an increasing trend of repairs expenses to net fixed assets. Using the model firm as a standard, it could be expected that for every \$1 increase in net fixed assets, repairs expenses might be expected to increase approximately 2 cents. Firm B and Firm C had practically no increase and a decrease respectively in the amount spent for repairs, even though net fixed assets had an increasing trend over the 10-year period for both firms.

⁶This comparison was found by dividing the average annual trend of labor expenses by the average annual trend of total operating expenses. All other comparisons like this were also found by dividing the average annual trend of the numerator of the ratio by the average annual trend of the denominator of the ratio.

TABLE 10.—Average Annual Trends of Labor Expenses to Total Operating Expenses, Labor Expenses, and Total Operating Expenses for Four Firms in Study, 1957-1966.

Firm	Average Annual Trend of Labor Expenses to Total Operating Expenses (%)	Average Annual Trend of Labor Expenses (\$)	Average Annual Trend of Total Operating Expenses (\$)
Model	-0.24	+5,413.	+10,082.
Firm A	-0.13	+1,506.	+ 3,667.
Firm B	-0.75	+1,839.	+ 4,116.
Firm C	-1.58	- 276.	+ 4,448.

TABLE 11.—Average Annual Trends of Fertilizer Sales to Total Sales, Fertilizer Sales, and Total Sales for Four Firms in Study, 1957-1966.

Firm	Average Annual Trend of Fertilizer Sales to Total Sales (%)	Average Annual Trend of Fertilizer Sales (\$)	Average Annual Trend of Total Sales (\$)
Model	+0.58	+24,107.	+182,597.
Firm A	+0.17	+ 8,013.	+123,899.
Firm B	+0.62	+ 9,991.	+ 59,645.
Firm C	—*	—*	+101,579.

*Data could not be segregated from financial audit of Firm C.

TABLE 12.—Average Annual Trends of Repairs Expenses to Net Fixed Assets, Repairs Expenses, and Net Fixed Assets for Four Firms in Study, 1957-1966.

Firm	Average Annual Trend of Repairs Expenses to Net Fixed Assets (%)	Average Annual Trend of Repairs Expenses (\$)	Average Annual Trend of Net Fixed Assets (\$)
Model	+0.03	+ 324.	+13,205.
Firm A	+0.12	+119.	+ 2,649.
Firm B	-0.39	+ 14.	+13,651.
Firm C	-0.19	-355.	+11,099.

TABLE 13.—Average Annual Trends of Grain Sales to Total Sales, Grain Sales, and Total Sales for Four Firms in Study, 1957-66.

Firm	Average Annual Trend of Grain Sales to Total Sales (%)	Average Annual Trend of Grain Sales (\$)	Average Annual Trend of Total Sales (\$)
Model	+0.18	+137,370.	+182,597.
Firm A	+0.31	+114,476.	+123,899.
Firm B	+0.14	+ 46,897.	+ 59,645.
Firm C	+4.08	+ 96,022.	+101,579.

TABLE 14.—Average Annual Trends of Truck Expenses to Total Operating Expenses, Truck Expenses, and Total Operating Expenses for Four Firms in Study, 1957-1966.

Firm	Average Annual Trend of Truck Expenses to Total Operating Expenses (%)	Average Annual Trend of Truck Expenses (\$)	Average Annual Trend of Total Operating Expenses (\$)
Model	-0.13	+417.	+10,082.
Firm A	+0.77	+875.	+ 3,667.
Firm B	+0.07	+539.	+ 4,116.
Firm C	+0.58	+353.	+ 4,448.

TABLE 15.—Average Annual Trends of Feed Sales to Total Sales, Feed Sales, and Total Sales for Four Firms in Study, 1957-1966.

Firm	Average Annual Trend of Feed Sales to Total Sales (%)	Average Annual Trend of Feed Sales (\$)	Average Annual Trend of Total Sales (\$)
Model	+0.05	+4,103.	+182,597.
Firm A	-0.17	+2,179.	+123,899.
Firm B	-0.41	+3,211.	+ 59,645.
Firm C	—*	—*	+101,579.

*Data could not be segregated from financial audit of Firm C.

TABLE 16.—Average Annual Trends of Labor Expenses to Net Fixed Assets, Labor Expenses, and Net Fixed Assets for Four Firms in Study, 1957-1966.

Firm	Average Annual Trend of Labor Expenses to Net Fixed Assets (%)	Average Annual Trend of Labor Expenses (\$)	Average Annual Trend of Net Fixed Assets (\$)
Model	+0.84	+5,413.	+13,205.
Firm A	+1.56	+1,506.	+ 2,649.
Firm B	-5.04	+1,839.	+13,651.
Firm C	-1.02	- 276.	+11,099.

Variable X_8 , grain sales to total sales, was the fourth independent variable to enter the step-wise regression problem for the model firm. Grain sales ranged from 68 to 90 percent of total sales for the four firms of the study during the 10-year period. The trends of grain sales to total sales, grain sales, and total sales are shown in Table 13.

The data in Table 13 indicate that all four firms in the study had increasing average annual trends of grain sales to total sales, grain sales, and total sales. Using the model firm as a standard, for every \$1 increase in total sales, grain sales might be expected to increase approximately 75 cents. Firm B was in this range. Firm A and Firm C both sold a higher proportion of grain than the model firm.

Variable X_{11} , truck expenses to total operating expenses, was the fifth independent variable to enter the step-wise regression problem for the model firm. The trends of truck expenses to total operating expenses, truck expenses, and total operating expenses are shown in Table 14.

The data in Table 14 indicate that the model firm had a decreasing average annual trend of truck expenses to total operating expenses, while the other three firms of the study had increasing trends. Using the model as a standard, for every \$1 increase in total operating expenses, a firm might expect truck expenses to increase approximately 4 cents. The other three firms were incurring more truck expenses than the model firm relative to total operating expenses.

Variable X_{10} , feed sales to total sales, was the sixth independent variable to enter the step-wise regression problem for the model firm. The trends of feed sales to total sales, feed sales, and total sales are shown in Table 15.

The data in Table 15 indicate that the model firm had a near-constant average annual trend of feed sales to total sales. Using the model firm as a standard, for every \$1 increase in total sales, a firm might expect an approximate increase of 2 cents in feed sales. Firm A met this standard. Based on the model as a standard, Firm B used too much of its resources in selling feed.

Variable X_5 , labor expenses to net fixed assets, was the seventh independent variable to enter the step-wise regression problem for the model firm. The trends of labor expenses to net fixed assets, labor expenses, and net fixed assets are shown in Table 16.

The data in Table 16 indicate that the model firm and Firm A had increasing average annual trends of labor expenses to net fixed assets. Firm B and Firm C had decreasing average annual trends for the same ratio. Using the model as a standard, for every \$1 increase in net fixed assets, a firm might expect an increase in labor expenses of approximately

TABLE 17.—Annual Change of Net Fixed Assets and Labor Expenses for Firm C, 1957-1966.

Years	Net Fixed Assets (\$)	Labor Expenses (\$)
1957-1958	— 7,761.	— 5,814.
1958-1959	— 1,538.	+ 3,091.
1959-1960	+ 8,461.	— 2,213.
1960-1961	+36,904.	+ 2,485.
1961-1962	— 3,227.	+ 5,775.
1962-1963	—15,405.	—11,002.
1963-1964	+29,359.	+ 6,304.
1964-1965	+64,460.	+12,253.
1965-1966	—37,241.	— 9,812.

40 cents. Firm B and Firm C are much lower than the model. Firm A is near the standard.

The analysis provided seven financial ratios which appear to be applicable for analyzing intra-firm trends of return on total assets for firms, even if the trends among firms are different. It also provided comparisons of how a component of a selected ratio reacts to changes of the other component of the ratio and what these changes were in absolute terms for the model firm. The three other firms of the study were included in the comparative analysis to find how they differed from the model firm.

This analysis provides some general guidelines which elevator managers can use in comparing their firm with the model firm and the three other firms of the study. As an example, the ratio of labor expenses to net fixed assets was analyzed for Firm C to illustrate the type of financial analysis an elevator manager can apply to his own financial statement. According to Table 16, the model firm might expect that labor expenses would increase approximately 40 cents for every increase of \$1 in net fixed assets. Annual changes of net fixed assets and labor expenses from 1957 through 1966 for Firm C are shown in Table 17.

Net fixed assets decreased \$7,761 from 1957 to 1958 and labor expenses decreased \$5,814 during the same period. For each \$1 decrease in net fixed assets, labor expenses decreased approximately 75 cents. This was a greater decrease than the 40 cents experienced by the model firm. Net fixed assets decreased \$1,538 from 1958 to 1959, while labor expenses increased \$3,091 over the same period. From 1957 through 1959, the total net fixed assets decreased \$9,299 while labor expenses decreased \$2,753. In other words, for each \$1 decrease in net fixed assets, labor expenses decreased approximately 30 cents.

Net fixed assets increased \$8,461 from 1959 to 1960 and labor expenses decreased \$2,213 during the

same period. The increase in net fixed assets and a decrease of labor expenses during the same period were opposite from that of the model firm. Thus, the firm apparently substituted too much capital for labor during this period.

Labor expenses increased when net fixed assets increased from 1960 to 1961, from 1963 to 1964, and from 1964 to 1965. In other words, for each \$1 increase in net fixed assets, labor expenses increased 7 cents, 21 cents, and 2 cents, respectively. These increases were far less than the model firm, which had an increase of 40 cents in labor expenses with each \$1 increase in net fixed assets.

The decreasing trend of labor expenses and the increasing trend of net fixed assets continued from 1960 through 1966, giving management an indicator that these relationships were out of balance. Each of the other six financial ratios can be used in a similar fashion by elevator managers to analyze their firm's financial operation.

SUMMARY

This study attempted to determine whether certain financial relationships could be used as guidelines for elevator managers to analyze the financial condition of their firm over time.

Four firms were selected for the study based on the trend of their return on total assets for the period from 1957 through 1966. A model firm was selected which had a consistently high return on total assets. A second firm was selected which had an increasing trend on return on total assets, a third was selected which had a trend of decreasing return on total assets, and a fourth was selected which had a trend of decreasing return on total assets and failed financially during the period of study.

A step-wise regression method was used for the model firm using 14 financial ratios as the independent variables and return on total assets as the dependent variable. Seven of the independent variables ac-

counted for a total R^2 of 99.77 percent. These ratios were:

1. Labor expenses to total operating expenses.
2. Fertilizer sales to total sales.
3. Repairs expenses to net fixed assets.
4. Grain sales to total sales.
5. Truck expenses to total operating expenses.
6. Feed sales to total sales.
7. Labor expenses to net fixed assets.

The applicability of using these ratios for firms with different trends of return on total assets was examined by solving step-wise regression problems for the other three firms of the study with the seven financial ratios as independent variables and return on total assets as the dependent variable. The total R^2 for Firm A was 98.79 percent; for Firm B, 94.84 percent; and for Firm C, 84.87 percent (with Firm C, two of the seven financial ratios were unobtainable because the financial information was segregated in the firm's financial audits). The results of the analysis provided evidence that the seven financial ratios which appeared useful in analyzing the model firm's trend of return on total assets were also applicable for analyzing the trends of return on total assets of the other three firms.

The average annual change in the financial ratios for the four firms is shown in Table 18. These ratios can serve as guidelines to compare the ratios of a model (profitable) firm to other firms used in this study. These ratios can also serve as guidelines to managers of country elevators to compare their operations to that of the firms used in this study for the purpose of directing their firm toward a more profitable operation or predicting its financial destiny.

The ratio of labor expenses to net fixed assets was analyzed for Firm C. This analysis was conducted to illustrate a procedure that an elevator manager can use to implement the results of this study and to show the predictive ability of intrafirm ratio analysis as a management aid.

TABLE 18.—Changes Experienced by Four Firms in Study in One Component of Each of Seven Important Financial Ratios Given a \$1 Change in Other Component for Period 1957-1966.

Components of Ratios		Model	Firm A	Firm B	Firm C
A	B	(cents)	(cents)	(cents)	(cents)
Total Operating Expenses	Labor Expenses	53.7	41.1	44.7	—6.2
Total Sales	Fertilizer Sales	13.2	6.5	16.8	—**
Net Fixed Assets	Repairs Expenses	2.5	4.5	0.1	—3.2
Total Sales	Grain Sales	75.2	92.4	78.6	94.5
Total Operating Expenses	Truck Expenses	4.1	23.9	13.1	7.9
Total Sales	Feed Sales	2.2	1.8	5.4	—**
Net Fixed Assets	Labor Expenses	41.0	56.9	13.5	—2.5

*Columns A and B are interpreted as: given a \$1 increase in the component of the ratio in Column A, the four firms experienced the change in the component of the ratio in Column B expressed in the table under each firm.

**Information not available from the financial audit of the firm.

Source: Original data.

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Center Headquarters, Wooster, Wayne County: 1953 acres

Eastern Ohio Resource Development Center, Caldwell, Noble County: 2053 acres

Jackson Branch, Jackson, Jackson County: 344 acres

Mahoning County Farm, Canfield: 275 acres

Muck Crops Branch, Willard, Huron County: 15 acres

North Central Branch, Vickery, Erie County: 335 acres

Northwestern Branch, Hoytville, Wood County: 247 acres

Southeastern Branch, Carpenter, Meigs County: 330 acres

Southern Branch, Ripley, Brown County: 275 acres

Western Branch, South Charleston, Clark County: 428 acres